

the wind still remains one of the most fascinating problems in agricultural engineering. The transmission of the current is next described. In this chapter, as in the preceding one, there are a number of diagrams to illustrate the principle of the apparatus, besides a good deal of information that will be useful when anything goes wrong. These chapters take up half the book.

The author then comes to the very important subject, How can electrical energy be utilised on the farm? The two applications developed in detail are the driving of engines and lighting. Its use for driving the machinery in the farm buildings, the chaff-cutter, the pulper, and so on, is obvious, but the author goes still further and describes a number of applications which as yet have only rarely been made. Some forty pages are devoted to electrical ploughing, the first attempts at which were made so far back as 1879, although as a practicable method nothing was done until 1894, when a start was made both in Italy and in Germany. The methods are almost exactly the same as for steam ploughing; indeed, the idea is taken direct from the steam plough but electricity is substituted for steam as the hauling power. In one system there are two electric motors at opposite ends of the furrows hauling the plough; in the other an anchor is used and there is one motor only. The problem here is really very simple; if steam ploughing is known to be beneficial electric ploughing will be equally so, and the question resolves itself solely into the relative cost of the power. Indeed, this statement holds true of most of the applications recommended by the author. His electrical threshing machine, for instance, is the ordinary machine driven by electrical power, so also are the refrigerating machines, pumps, and sawmills.

The application of electricity as a source of light affords a great deal of scope for the author's ingenuity, since many of the farm operations, such as the milking and feeding of dairy cows, have to be carried out before daylight during part of the year. Suitable lamps are suggested for the various buildings.

There is also a useful chapter on treatment of accidents caused by electricity and precautions to be taken in order to avoid accidents. Lastly we have some well-illustrated descriptions of farms where some of these applications are in actual use. Probably to the English reader this is the most interesting chapter of all. Whether we may expect to see electricity utilised on British farms is another matter. Up to the present electricity has simply been taking the place of steam to work the old implements originally designed for human or horse labour. Probably before it comes into common use in agriculture our implements will have to be re-modelled and adapted to electrical power. In the cases described by the author water power is available or electric current is being transmitted through the district. The farmer can calculate exactly how much his power will cost him and whether it is worth while replacing the oil engine by a motor.

The book forms a useful contribution to agricultural engineering, and will make very suggestive reading for the thoughtful agriculturist.

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THE PHENOMENA OF THE EARTH'S SURFACE.

Physiography for Schools. By R. D. Salisbury. Pp. viii + 530. (London: John Murray, 1909.) Price 6s. net.

THIS book may be looked on as a reduction of the advanced course by the same author. Prof. Salisbury states in his preface that he differs from other writers on physical geography "as to the points upon which emphasis should be laid and the objects to be attained." But it would require careful reading to find out in what matters of principle this text-book differs from others by American authors, and we fancy that schools will adopt one book or the other rather from some attraction between the teacher and the author than from any preference as to mode of treatment. We miss the "cycle of erosion," and its accompaniment, the "peneplain," which have taken quite an affectionate hold upon our minds; but we meet the "mesa" and the "monadnock," and the really awkward adjective "piedmont," this last being used without explanation, and applied to certain plains as well as glaciers.

Valley-forms are agreeably dealt with as expressions of youth, maturity, or old age, and the excellent chapter on the "Work of Running Water" may be taken as typical of the first part of the book. We should not like to spare any of its numerous maps and illustrations, which bring before us all manner of details in the history of a stream; at the same time, we should like to hear more from the author, whose lines are modestly dovetailed in between them. A specially effective feature of part i. is the insertion of some twenty contoured maps in colour, often on a scale of one inch to one mile, selected from the topographic sheets of the United States Geological Survey. With this example before us, must we wait long for a European work, similarly illustrated from our British contoured maps, and also, perhaps, from the 1:200,000 sheets of the Austrian Military Institute?

The later parts of the book, on "Earth Relations," "The Atmosphere," and "The Ocean," do not lend themselves so temptingly to illustration; but numerous diagrams and charts are given, and the instruction in the text is singularly clear. Fig. 351, showing how the length of a degree is related to polar flattening, requires more thought than a child is likely to bring to bear on it. Perhaps a diagram showing how longer distances have to be traversed as we go northward, in order to shift the altitude of the pole star by so many degrees, might have been simpler, in illustration of the description on the following page. Snow crystals are named "snowflakes" in the title of Fig. 176; and Fig. 450 shows the sounding-tube, and not the line, as stated. We fear that the abrupt question to the reader, "Why not use a rope, instead of a wire, in sounding?" may be taken as a suggestion from the gifted author, and may turn the young mind in a wrong direction. But there is little to criticise in this closely-written text-book. We return to the pages on the work of rivers and of ice with special pleasure. The author thinks (p. 168) that plastic flow does not play any real part in glacier motion, and lays stress

on the re-freezing of water that has sunk from above into the ice-mass. The recently published work on glacial phenomena in the Bighorn Mountains has been promptly utilised, and one of the fine cirques, though not our own favourite picture, is shown on p. 179. Chapter xix., on the relations of plants and animals to their environment, has been contributed by Dr. Cowles and Mr. C. C. Adams. G. A. J. C.

OUR BOOK SHELF.

An Atlas of Absorption Spectra. By Dr. C. E. K. Mees. Pp. 74. (London: Longmans, Green and Co.; Croydon: Wratten and Wainwright, Ltd., 1909.)

ALL scientific workers who have had occasion to employ colour-sensitive photographic plates during the last few years will probably have wished at some time to learn some details as to the specially great advances made in their preparation. Also for the efficient use of the plates suitable screens or colour-filters are required to equalise the action of the various colours. Dr. Mees, as director of the firm of Wratten and Wainwright, has had exceptional facilities in dealing with these matters, and in publishing this atlas he is giving others the benefit of his work. The spectra were taken on the spectrum panchromatic series of plates, which, in addition to the usual region of maximum sensitiveness in the violet, show another maximum near λ 6500 in the red, with gradually decreasing action to λ 7500. To obtain as even records as possible, two schemes were adopted:—(1) For the spectra of dyes an equalising screen of special composition, with two cells of mandarin-orange and P-nitrosodimethylaniline, was used with a Nernst lamp; in the case of special dyes the spectra were photographed in two sections for convenience; in front of the slit a wedge-shaped cell was fitted containing the dye solution, with a similar cell filled with pure water the opposite way to compensate for any prismatic effect. By this means the light passed through varying thicknesses of absorbing medium from end to end of the slit, and the resulting spectra show curves bounding the absorption bands which indicate graphically the change in absorption with varying thickness of dye. (2) For the spectra of the colour-filters the wedge cell could not be employed, and in its place a black wedge of specially prepared glass was used. This gave a range of intensity from 1 to 10,000.

The atlas contains reproductions of the spectra of 170 dye-stuffs, most of them obtained from the Höchst Farbwerke, and of 76 colour-filters prepared by Messrs. Wratten and Wainwright for various purposes, which are clearly stated. All the photographs are scaled in wave-lengths, so that by mere inspection the exact range of any absorption may be ascertained. A concise index is given, including the name of dye, concentration, source, whether it is acid or basic, and a scale of numbers representing the relative stability to light. Series of monochromatic filters are supplied and illustrated, which practically isolate a very small portion of the spectrum in each case, these being suitable for work requiring great precision in the wave-length of light employed.

Physiology of Man and Other Animals. By Dr. Anne Moore. Pp. xiii+212. (New York: Henry Holt and Co., 1909.) Price 80 cents.

THIS little book is intended for the use of children in schools; about half of it is devoted to elementary physiology, and the remainder to elementary zoology. The author has the gift of putting things clearly, and in a manner likely to interest the young. She,

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however, very soon gets out of her depth, and often makes mistakes of the most elementary nature. This is particularly noticeable when she speaks about the nervous system or strays into the region of chemical physiology. There is no clear distinction made between the central and the peripheral nervous system, and no mention made of the functions of the brain as the organ of mind; the depressor nerve is stated to cause slowing of the heart, and the sympathetic nerves, we are told, received their name because of their extreme sensitiveness.

Her definition of osmosis would not be acceptable to any physicist or physiologist; she has not even grasped the distinction between internal and external respiration. We are told that carbon dioxide stimulates the respiratory muscles to action; that the secretion of the sebaceous glands is a part of the secretion of the sweat glands; that lipase is the most important ferment of the pancreatic juice; that peptones are absorbed and pass to the liver; that fats are hydrocarbons; and that the formula for starch is $C_6H_{12}O_6$. Such examples of glaring errors are quite sufficient to show that the book cannot be recommended as a safe guide to those who have passed childhood, and even for children it seems a pity that some degree of exactness should not be aimed at.

Deutsche Südpolar-Expedition, 1901-1903. Bd. ii. Geographie und Geologie. Heft 5. Pp. 348-410; pls. xxviii-xxx. (Berlin: Georg Reimer, 1909.) Price 8 marks.

THE German South Polar Expedition called for a few hours at the islands at St. Paul and New Amsterdam, and though in so short a visit but little fresh information was obtained, one of the valuable by-products of the expedition is a useful summary and discussion of all that is known about these islands. New Amsterdam was discovered in 1522 by Sebastian del Cano, who commanded Magellan's expedition after his death at Manila. Both islands are French possessions. They are both solely volcanic, and rise from a common base. New Amsterdam is composed only of basalt, while St. Paul consists of basalt with some rhyolite tuffs and obsidian. The memoir on the geography of the islands is by Dr. von Drygalski, on the geology by Philippi, and on the petrology and the relations of the lavas to those of Kerguelen, Possession, and Heard Islands by Reinisch. E. Vanhöffen contributes a catalogue of the flora and of the fauna, which consists only of insects, myriapods, spiders, tardigrades, crustacea, rotifers, &c. The memoir has three excellent plates illustrating the scenery and volcanic features.

Les Progrès récents de l'Astronomie (1908). By Prof. Paul Stroobant. Pp. 115. (Brussels: Hayez, 1909.)

EVERYONE interested in the progress of astronomy will welcome the appearance of Prof. Stroobant's annual summary of a year's results, and 1908 was by no means a barren year. Hale's discovery of the Zeeman effect in the solar spectrum, the Flint Island eclipse, the Lowell Observatory observations of the planets and their spectra, the discovery of J viii by Melotte at Greenwich, and the preliminary comet campaign provided by the appearance of 1908 III, are all reviewed in a fashion at once comprehensive and clear. The omissions are few, but we regret to find no mention of the McClean expedition to Flint Island. Four plates illustrate various researches, and the tables of results will be found useful for reference. Although each result appears under a general and a special heading, the addition of an index to this small volume would, we believe, enhance its value.

W. E. R.